WHAT IS CLAIMED IS:

1. A data transmission method for transmitting data through a transmission line that is integrated with a plurality of links including a first link group, a second link group, and a third link group, the method comprising:

transmitting information data through the first link group that comprises at least one link included in the plurality of links;

transmitting parity data generated from the information data througt the second link group that comprises at least one link included in the plurality of links that is different from the first link group; and

transmitting error check data generated from the information data and the parity data, which is used for an the error correction when an error occurs in the information data or the parity data, through the third link group that comprises at least one link included in the plurality of links that is different from the first link group and the second link group.

2. The method according to claim 1, further comprising:

compensating a difference of arrival time between at least two among the information data, the parity data and the error check data, when the difference of arrival time occurs; and

establishing a synchronization of the information data, the parity data and the error check data.

3. The method according to claim 2, further comprising:

compensating, when the error correction of the information data or

the parity data is performed by using the error check data, the difference of arrival time of the information data, the parity data and the error check data to detect the difference of arrival time, in which the error correction does not continuously occur; and

establishing a synchronization of the information data, the parity data and the error check data, using the detected difference of arrival time.

4. The method according to claim 1, further comprising:

judging whether the lost of information data occurs in at least one link included in the first link group, based on the result of comparison of the information data and the parity data;

calculating an error rate from the data transmitted by the first link group, the data transmitted by the second link group, and the error check data transmitted by the third link group: and

replacing, when a loss of the information data occurs, the lost information data with the information data reproduced from the parity data, based on the result of a comparison of the error rate and a predetermined value.

5. The method according to claim 1, further comprising:

calculating an error ratio and an error ratio variation per unit time from the data transmitted by the first link group, the data transmitted by the second link group and the error check data transmitted by the third link group; and

replacing the data transmitted by the first link group with the

information data reproduced from the parity data when the error rate variation per unit time abruptly increases beyond a predetermined value.

6. The method according to claim 1, further comprising:

generating the information data from a plurality of parallel signals that are composed of a bit string including a plurality of bits;

generating the parity data from a signal that is composed of a parity calculated from the bit string;

generating the error check data from at least one check signal that is composed of a check bit string generated by using an error correction code obtained from the bit string and the parity;

transforming the generated information data, the generated parity data and the generated error check data into a plurality of serial signals;

transmitting each of the plurality of serial signals through the first link group the second link group and the third link group;

receiving the transmitted plurality of serial signals;

converting the received plurality of serial signals into information data, the parity data and the error check data;

detecting the error of the information data and the parity data by using the check bit string included in the error check data; and

correcting the error of the information data by using the check bit string when an error is detected in the information data, and correcting the error of the parity data by using the check bit string when an error is detected in the parity data.

7. A transmitting apparatus for transmitting data through a transmission line that is integrated with a plurality of links, comprising:

an interface for a first link group that transmits information data by at least one of the plurality of links;

a parity generation module that generates parity from the information data;

an interface for a second link group that transmits the parity data by at least one link included in the plurality of links, which are different from the first link group;

an error check data generation module that generates an error check data used for an error correction from the information data and the parity data when the error occurs at least one of in the information data and the parity data; and

an interface for a third link group that transmits the error check data by at least one link included in the plurality of links, which are different from the first link group and the second link group,

wherein the interfaces transmit data synchronously through the first link group, the second link group and third link group.

8. The transmitting apparatus according to claim 7, wherein

the first link group comprises a parallel signal generation module, which generates the information data from a plurality of parallel signals including the bit string composed of a plurality of bits,

the second link group comprises a parity signal generation module, which generates the parity data including parity bit string corresponding to

the bit string included in the parallel signal, and

the third link group comprises a check signal generation module, which generates the error check data by integrating the check bit generated form the bit string included in the parallel signal and bit string included in the parity data by using an error correction code generating matrix.

9. The transmitting equipment according to claim 7, converts data generated by the parallel signal, the parity signal and the check signal into a wavelength multiplex signal, which is allocated to a different wavelength, and transmits the wavelength multiplex signal into the transmission line.

10. The transmitting equipment according to claim 7, converts data generated by the parallel signal, the parity signal and the check signal into a plurality of optical signals, and transmits the optical signals to a plurality of optical fibers comprising the transmission line.

11. A receiving apparatus for receiving data transmitted through a transmission line that is integrated a plurality of links, comprising:

a signal conversion module that receives a signal from the transmission line, and converts received signal to a plurality of parallel signals, parity signal and check signal;

an error correction module that corrects error of the parallel signals based on the check signal when an error occurs in the plurality of the parallel signals, and corrects error of the parity signal based on the check signal when an error occurs in the parity signal;

a parity decoding module that decodes a lost signal based on the parity signal, when part of the parallel signals is lost, and

a selection module that selects either of the received parallel signal or a decoded signal based on the parity signal, and outputs selected signal as information data.

12. The receiving apparatus according to claim 11, wherein the signal conversion module comprises a compensating module, which compensates the difference of arrival time in order to establish a synchronization of the plurality of parallel signals, the parity signal, and the check signal, when there is a difference of arrival time of at least two out of the plurality of parallel signals, the parity signal and the check signal.

13. The receiving apparatus according to claim 12, wherein:

the compensating module detects a difference of the arrival time, in which the error correction does not continuously occur, when the error correction of the plurality of parallel signals or the parity signal is performed by the check signal; and

the selection module compensates the difference of arrival time in order to establish the synchronization of the plurality of parallel signals of the parity signal and the check signal according to the detected difference of the arrival time.

14. The receiving apparatus according to claim 11, wherein:

the selection module judges whether part of the plurality of parallel

signals is lost, based on the result of the comparison of the plurality of parallel signals with the parity signal;

the selection module calculates an error rate of the plurality of parallel signals or the parity signal by the error check signal; and

the selection module replaces, based on the result of comparison of the error rate with a predetermined value, the lost parallel signals with the parallel signals decoded from the parity signal when part of the parallel signals is lost.

15. The receiving apparatus according to claim 11, wherein:

the selection module calculates an error rate of at least one of the plurality of parallel signals and the parity signal and an error rate variation per unit time, and

the selection module replace the parallel signal with the decoded parallel signal when the error rate variation per unit time abruptly increases beyond a predetermined threshold.

16. The receiving apparatus according to claim 11, wherein the signal conversion module receives a wavelength multiplex signal, which is transmitted by the transmission line, and converts the received wavelength multiplex signal to a plurality of the parallel signals, the parity signal and the check signal.

17. The receiving apparatus according to claim 11, wherein the signal conversion module receives an optical signal, which is transmitted by a

plurality of optical fibers included in the transmission line, and converts the received optical signal to a plurality of the parallel signals, the parity signal and the check signal.